THE LAW OFFICES OF
MARK O. LOFTIN, P.C.

MEMBER, ALABAMA STATE BAR
REGISTERED PATENT ATTORNEY

September 21, 2007

APPL NO.:**10/718,351** UNIT ART NO: **3749** FILING DATE: **11-21-2003**
EXAMINER: **ALFRED BASICHAS** INVENTION TITLE: **A METHOD AND DEVICE FOR COMBUSTING LIQUID FUELS** CONFIRM. NO.: **9879**

AMENDMENTS TO THE CLAIMS

What is claimed and desired to be secured by United States Letters Patent is:

1. (currently amended) A method of combusting a liquid primary fuel comprising the steps of:

establishing a first zone of combustion formed by radially inwardly directed intersecting flames comprised essentially of burning hydrogen ~~(H2)~~ gas supplied from an external source and spaced from a fuel nozzle, ~~and defined by a flame of ignited hydrogen,~~

establishing a second zone of combustion comprising an atomized primary fuel that is ignited by contact with the first zone of combustion. ~~dispersing a liquid primary fuel through said nozzle into the zone of combustion in a partially vaporized and partially atomized state, and~~

~~burning the vaporized liquid primary fuel and the atomized liquid primary fuel entering said zone of combustion.~~

2. (currently amended) The method of claim 1 wherein the first zone of combustion is established by the steps of:

providing a pressurized source of hydrogen ~~(H2)~~ through a conduit having a discharge opening adjacent to said first zone of combustion,

igniting the hydrogen exiting ~~discharged~~ through said discharge opening to produce a hydrogen flame; and

mechanically rotating the hydrogen flame about a longitudinal axis of the first zone of combustion.

3. (withdrawn) The method of claim 2, further comprising the step of setting a speed of the rotating hydrogen flame to optimize a combustion efficiency of the primary fuel.

4. (currently amended) The method of claim 2 where the ~~source of~~ hydrogen flowing through the conduit includes at least a stoichiometric amount of oxygen ~~(O2)~~ to sustain combustion of the hydrogen ~~(H2) comprises a predetermined mixture of hydrogen and oxygen~~.

5. (withdrawn) The method of claim 2 wherein said discharge opening is radially spaced from said longitudinal axis and angled toward the central axis of rotation.

6. (previously presented) The method of claim 2 wherein a speed of the rotating hydrogen flame in a circumferential direction is not less than the forward flame velocity of the ignited hydrogen.

7. (previously presented) The method of claim 1 wherein said step of dispersing said liquid primary fuel further comprises flowing a pressurized source of liquid primary fuel through a conduit of a rotating shaft and including a discharge end having an atomizing nozzle to discharge the liquid primary fuel into the zone of combustion.

8. (canceled)

9. (previously presented) The method of claim 1 where said primary fuel is selected from the group comprising processed and unprocessed vegetable oils, by-product oils from agricultural products processing, liquid and liquefied petroleum fuels, and liquid and liquefied animal fats.

10. (currently amended) The method of claim 2 where the step of providing pressurized hydrogen ~~(H2)~~ from the hydrogen source further includes the steps of:

generating a constant rate of hydrogen ~~(H2)~~ and oxygen ~~(O2)~~ gases from the electrolysis of water, and

transferring the hydrogen ~~(H2)~~ and oxygen ~~(O2)~~ gases into a fixed-volume staging chamber such that the hydrogen and oxygen gases are continuously exposed to an inlet opening of the conduit.

11. (currently amended) The method of claim 1 further including a step of injecting a controlled rate of an additive selected from steam or water into the first zone of combustion. ~~to control the formation of oxides of nitrogen.~~

12. (currently amended) The method of claim 11 wherein the injection of said additive is accomplished by pre-mixing the additive ~~water~~ at a controlled rate with the liquid primary fuel.

13. (withdrawn) A burner for combusting a liquid primary fuel and hydrogen comprising:

a rotating shaft with a proximal end and a distal end connected to a burner tip,

a pair of circular hydrogen transport channels formed inside the rotating shaft, each channel having an inlet portion with an inlet port communicating exterior to the shaft for receiving the hydrogen from a source, and an axial portion extending from said inlet portion longitudinally to a burner tip flange,

a primary fuel conduit formed inside the shaft, said conduit having an inlet port for receiving the liquid primary fuel, and an axial portion running perpendicular to the longitudinal axis of the shaft for transporting the primary fuel from the inlet port to the burner tip flange,

a coolant chamber formed around the shaft closest to the distal end for containing a circulating coolant fluid,

a hydrogen chamber containing a pressurized hydrogen gas source in fluid communication with said hydrogen transport channels , and

a primary fuel chamber containing a pressurized primary liquid fuel in fluid communication with said primary fuel conduit.

14. (canceled)

15. (canceled)

16. (withdrawn) The burner of claim 13 where the axial portion of the hydrogen transport tubes extends away from the longitudinal axis of the shaft at an angle between 10 and 30 degrees relative to the longitudinal axis.

17. (withdrawn) The burner of claim 13 wherein the burner tip is comprised of:

a solid circular flange having a proximal face attached to the end of the shaft, a distal face adjacent to a combustion zone, a hole for passing the liquid primary fuel from the primary fuel conduit and a pair of holes for passing the hydrogen from the hydrogen transport tubes,

a pair of hydrogen discharge tubes extending from the hydrogen holes and projecting away from the distal face of the flange in an axial direction with respect to said shaft, and then in a direction which intersects the longitudinal axis of said shaft; and

a liquid dispersing nozzle disposed at the primary fuel hole for discharging the primary fuel into the combustion zone.

18. (withdrawn) The burner tip of claim 17 where said hydrogen discharge tubes include a first axial portion having a length between 0.5 and 3 inches, an inwardly directed portion having a length between 0.5 and 3 inches, and wherein said axial direction is defined by an angle between 22 and 60 degrees relative to the axial centerline of said axial portion of said hydrogen transport tubes.

19. (withdrawn) The burner of claim 13 further including an electrolytic cell for generating hydrogen and oxygen gases connected to the hydrogen chamber, where the rate of hydrogen being fed to the burner is controlled by varying the surface area of the electrolytic plates and the current input to the electrolytic cell.

20. (withdrawn) The burner of claim 13 further including a fourth chamber around the shaft for staging a secondary material to be injected into a combustion zone, with the shaft including additional transport tubes located therein for transporting the secondary material to the burner tip.

21. (currently amended, withdrawn) The method of claim 1 wherein the first zone of combustion is defined by generally conical surface symmetric about a longitudinal axis.

22. (withdrawn) The method of claim 4 wherein that predetermined mixture of hydrogen is a molar ratio of hydrogen to oxygen having a value of 2:1.

23. (canceled)

24. (currently amended) The method of claim 2 further comprising the steps of providing a second conduit for delivering hydrogen through a second discharge opening adjacent to the first zone of combustion, igniting the hydrogen discharging through said second discharge opening to produce a second hydrogen flame, and rotating said second hydrogen flame about the longitudinal axis.

25. (previously presented) The method of claim 24 further comprising the steps of providing a plurality of additional conduits for delivering hydrogen through additional discharge openings with said additional discharge openings extending radially outward from the longitudinal axis relative to the first two hydrogen discharge openings, igniting the hydrogen discharging through said additional conduits to produce a plurality of hydrogen flames, and rotating said plurality of hydrogen flames about the longitudinal axis in the same rotational direction as said first and second discharge openings.

26. (previously presented) The method of claim 25 where the plurality of additional conduits for delivering hydrogen are rotated in a direction opposite to the first and second conduits along the longitudinal axis.